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ABSTRACT

The teaching function is examined to determine an improved budgetary planning and control system as well as comparisons across universities and polytechnics. The inputs, outcomes and processes of the teaching function are identified and defined, with available data collected and measured with reference to those defined variables and parameters. Institutional objectives of the teaching function are cited as optimization of the student intake potential, the pass rates, learning gain, and student employability. Teacher performance measures are identified as: (1) the average A level points score of enrollments compared with the average A level points score anticipated or some similar measures of the quality of client response; (2) the ratio of successes, failures and dropouts to enrollments; the learning gain; the relationship of each direct input (academic staff, teaching spaces, departmental administration and technician support, consumables and equipment) to enrollments, successes, and learning gain; and (3) feedback on graduates' initial employment and salaries. Statistical comparisons are given for the 1972-73 year, and projected research on such problem areas as measurement of learning gain is outlined. (LBH)

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PROGRAMME ON INSTITUTIONAL MANAGEMENT IN HIGHER EDUCATION

IDENTIFICATION OF PERFORMANCE INDICES FOR TEACHING ACTIVITIES

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ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT

Centre for Educational Research
and Innovation

Paris, 18th December, 1974
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Programme on Institutional Management
in Higher Education

The Development of Performance Indices for the Teaching Function in Higher Education

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Second General Conference of Member Institutions
(Paris 20-22 January 1975)

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I

NOTE BY THE SECRETARIAT

At any given point in time, the research groups of OECD's Programme on Institutional Management in Higher Education are in varying stages of advancement, since each has its own predetermined starting date and duration. On the occasion of the programme's Second General Conference of Member Institutions, final reports on the findings of three research groups which completed their work during 1974 are being presented. In addition, however, the Conference provides an opportunity for representatives of all the Member institutions to become acquainted with investigations in progress by other research groups participating in the programme. Thus, invitations have been extended to five on-going groups to present progress reports at the Conference. The topics included are :

- Identification of indices of performance for teaching activities;
- Identification of indices of performance for service activities;
- The use of cost-effectiveness and cost-benefit techniques in planning courses of study for new higher educational institutions;
- The costing and management of university grants and contracts; and
- Economic and pedagogical aspects for managing new communication technologies in higher education.

Of the above listed topics, the first three are the subject of full-scale investigations to be carried out over a two-year time span. By contrast, feasibility studies of a relatively limited scope have been carried out in the case of each of the last two topics and it is expected that these feasibility studies will lead to the formulation and implementation of full-scale projects in a second stage.

The objectives of this project are to move towards a clearer understanding and specification of the teaching function in higher education and to permit an improved budgetary planning and control system as well as comparisons across universities and polytechnics. To achieve this purpose the following steps were set out :

(i) identification and definition of inputs, outcomes and processes of the teaching function;

(ii) data collection and measurement of the variables and parameters identified; and

(iii) establishment of a set of performance indicators and investigation of their uses in varying budgeting and control strategies.

The Centre for Educational Research and Innovation wishes to express its sincerest thanks to the members of the U.K. research group for providing us with the attached report on the progress being made on this project, which will continue during 1975.

"The Development of Performance Indices for the Teaching Function in Higher Education"

1.01. Preamble

At a meeting concerned with OECD-CERI Program on Institutional Management in Higher Education held in London on 15th November 1972 a number of Universities and Polytechnics declared their interest in collaborating on an investigation into "performance indicators such as the use of staff time, capacity utilisation and staff student ratios" in their institutions.

1.02.

At the request of CERI a formal proposal of research into this area was drafted and three areas of research activity were defined - teaching, central services and research - and the institutions were asked to state their preferred areas. Loughborough University and Lanchester Polytechnic opted to seek funding to undertake a joint investigation into the teaching function and a preliminary presentation of the proposal was made at the OECD-CERI Conference in Paris on January 8-10,1973.

1.03.

Subsequently a research contract was signed with the Department of Education and Science to take effect from 1 December 1974. The main responsibility for carrying out the investigation would rest with Loughborough and Lanchester but once a framework had been developed and tested within these two institutions data would be collected from associated universities and polytechnics. At the same time Leeds University and Huddersfield Polytechnic agreed to lead an investigation into performance indices for central services and Bath University undertook a pilot study on the costing of research contracts.

2.01. Project Objectives

The broad objectives of this project are "to move towards a clearer understanding and specification of the teaching function in higher education and, hence, to permit an improved budgetary planning and control system and also comparisons across universities and polytechnics".

To achieve this purpose the following steps were set out:

(i) Identify and define the inputs, outcomes and processes of the teaching function;

(ii) Collect data and measure (as far as is possible) the variables and parameters identified in (i); and

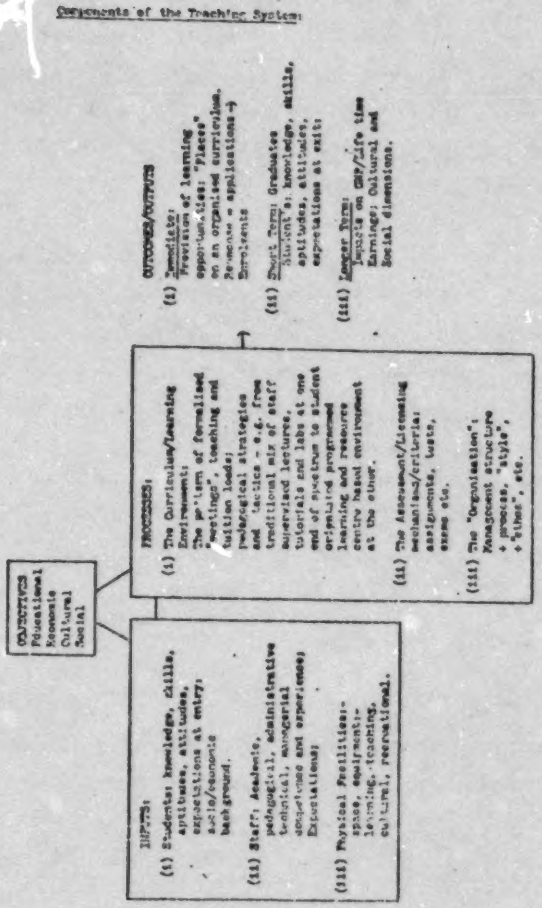
(iii) Establish a set of performance indicators and investigate their use in varying budgeting and control strategies.

2.02.

Figure I below identifies what we believe to be the major internal components of the teaching function. Within the constraints of the projects' modest budget and two year time scale it is not possible to collect and to analyse data on all the components identified. Accordingly we are concentrating on those aspects for which data is most readily available and quantifiable and have made assumptions as to institutional objectives and targets.

FIGURE I

Components of the Teaching System


OUTCOMES/OUTPUTS
(i) Immediate:
Provision of learning opportunities: "Places" on an organised curriculum. Persons - applications - Enrolments
(ii) Short Term: Graduates Students': knowledge, skills, aptitudes, attitudes, expectations at exit:
(iii) Longer Term:
Impacts on GNP/life time Earnings: Cultural and Social dimensions.
PROCESSES:
(i) The Curriculum/Learning Environment:
The pattern of formalised "meetings", teaching and tuition loads;
Pedagogical strategies and tactics - e.g. from traditional mix of staff supervised lectures, tutorials and labs at one end of spectrum to student originated programmed learning and resource centre based environment at the other.
(ii) The Assessment/Licensing mechanisms/criteria: assignments, tests, exams etc.
(iii) The "Organisation": Management structure + process, "style", + "ethos", etc.
INPUTS:
(i) Students: knowledge, skills, aptitudes, attitudes, expectations at entry; socio/economic background.
(ii) Staff: Academic, pedagogical, administrative technical, managerial competence and experience; Expectations;
(iii) Physical Facilities: space, equipment: learning, teaching, cultural, recreational.
OBJECTIVES
Educational
Economic
Cultural
Social

2.03.

We have decided not to collect data on:

(i) The students' socio-economic backgrounds or their attitudes and expectations at entry and exit;

(ii) The 'quality', expectations and values of the staff;

(iii) The management structure and process; and

(iv) The long term impacts of higher education.

We believe these variables to be significant but the collection and analysis of data on each would be an heroic exercise in itself and is not possible within the projects' budgeting and time constraints. However, the present investigation was conceived as a preliminary exercise which hopefully would lead on to further research into these less easily quantified more behavioural aspects.

2.04.

So far as institutional objectives are concerned the project accepts the Department of Education and Science's statement of overall aims for the teaching function in higher education as being: "To provide higher education for those who could benefit from it. To meet the requirements of society for qualified manpower". Students may choose to enrol or not in higher education and, having enrolled, the majority of them are aiming for specific qualifications and career prospects. Consequently within each institution the following more proximate goals might be postulated:

Subject to maintaining academic standards and satisfactory cost constraints:

(i) To optimise the student intake "potential";

(ii) To optimise the pass rates;

(iii) To optimise the learning gain as measured by some index of student achievement at entry and exit; and

(iv) To optimise student employability.

2.05.

Arising out of this set of institutional objectives the following performance measures were tentatively agreed by the projects' Steering Committee:

(i) At the beginning of a study program:

The average A level points score of enrolments compared with the average A level points score anticipated or some similar measures of the 'quality' of client response. *

*The normal minimum entry qualifications for a University/Polytechnic undergraduate program are two subjects at Advanced Level (A-Level) of the General Certificate of Education and/or (less usually) the appropriate Ordinary National Certificate (ONC) or Ordinary National Diploma (OND).

(ii) At the end of each year of a study program

The ratio of successes, failures and dropouts to enrolments;
The learning gain; and
The relationship of each direct input (academic staff, teaching spaces, departmental administration and technician support, consumables and equipment) to enrolments, successes, and learning gain.

(iii) At the end of the final year of a study program

(i) and (ii) to be computed for the complete study program cycle; and
feedback on graduates' initial employment and salaries.

2.06.

Since December 1973 we have been collecting the information and writing and proving the computer programs necessary to establish the data base implied in 2.05 for the academic year 1972/73 for Lanchester and Loughborough. This work is now almost completed but our original time schedules have proved optimistic and it is clear that the search in the associated institutions within the two year span of the project will be limited to some of the undergraduate programs in the more popular discipline areas.

2.07.

It became apparent very soon into the investigation that the timetable analysis and the students' academic record would make heavy demand on the time of the project team. The timetable analysis was difficult because of the complexity of the pattern of meetings at Loughborough: the student record presented problems because at Lanchester the data system is in its infancy, handwritten and, in parts, incomplete. However, this part of the project is now well advanced and discussed below.

3.01. The Lanchester and Loughborough contexts

Before reviewing what has been achieved to date it is appropriate to outline the Lanchester and Loughborough contexts.

3.02.

Lanchester Polytechnic was designated on 1 January 1970 and was formed from three institutions of higher education - Lanchester College of Technology, Rugby College of Engineering Technology and Coventry College of Art. As a consequence the Polytechnic occupies sites in Coventry and Rugby some 14 miles apart.

3.03.

The enrolment in 1972/73 was over 5000 of which over 3000 were full time and sandwich students. The Polytechnic has four faculties - Engineering, Applied Science, Social Science and Art and Design with full time and sandwich enrolments in 1972/73 of 929, 688, 1204 and 267 respectively. The majority are registered for first degrees awarded by the Council for National Academic Awards although the Polytechnic offers a range of study programs from sub degree to postgraduate level.

3.04.

In 1972/73 over 40 independent degree programs, in the main separately timetabled, were offered. More recently the Polytechnic has rationalised its course pattern by introducing two modular degree programs and is planning to develop this particular provision of education in the next few years.

3.05.

Loughborough University of Technology received its charter in April 1966 the first of the former Colleges of Advanced Technology to achieve university status. Its predecessor, Loughborough College, introduced full time advanced courses in science and technology in 1918. One of the distinguishing features of the earliest courses was the sandwich principle, the integration of practical training with academic studies, and this has been maintained.

3.06.

The enrolment in 1972/73 was over 3000 of which 2541 were full time or sandwich first degree students. The University has four schools - Engineering, Pure and Applied Science, Human and Environmental Studies and Educational Studies - with enrolments in 1972/73 of 1250, 738, 461 and 92 undergraduates respectively.

TABLE 1

1972/73 ENROLMENTS TO STUDY PROGRAMS INCLUDED IN PROJECT SURVEY

	LANCHESTER						LOUGHBOROUGH				
DISCIPLINE:	A	B	C	D	TOTAL	%	A	B	C	TOTAL	%
Sandwich											
Education	-	-	-	-	-	-	22	7	2	31	1.2
Technology & Engineering	270	234	212	-	716	31.1	549	313	257	1119	44.3
Science & Applied Science	72	60	49	-	181	7.8	87	84	64	235	9.3
Social & Business Studies	133	130	127	8	398	17.3	72	24	29	125	5.0
Urban & Regional Planning	24	23	19	21	87	3.8	-	-	-	-	-
Librarianship	-	-	-	-	-	-	-	-	-	-	-
Languages Studies	-	-	-	-	-	-	-	-	-	-	-
TOTAL	499	447	407	29	1382	60.0	730	428	352	1510	59.8
Full time											
Education	-	-	-	-	-	-	-	-	-	-	-
Technology & Engineering	-	-	-	-	-	-	148	100	94	342	13.5
Science & Applied Science	150	103	108	-	361	15.7	127	108	97	332	13.1
Social & Business Studies	182	147	129	-	458	19.9	103	56	33	192	7.6
Urban & Regional Planning	-	-	-	-	-	-	-	-	-	-	-
Librarianship	-	-	-	-	-	-	29	21	15	65	2.6
Languages Studies	38	33	30	-	101	4.4	39	19	27	85	3.4
TOTAL	370	283	265	-	920	40.0	446	304	266	1016	40.2
OVERALL	869	730	674	29	2302	100.0	1176	732	618	2526	100.0

3.06.

Table 1 gives details of the numbers of students enrolled on study programs included in the investigation. Sandwich students on these courses who spent the whole of the academic year 1972/73 out of college at practical training are omitted. The total numbers involved in each institution are very similar and the split between sandwich and full time in each institution is virtually identical. In both institutions the large majority of students are to be found in either technology and engineering, pure and applied science, or social and business studies. However, within these three discipline areas the mix is different:-

engineering and technology (58%) is clearly the most popular discipline area at Loughborough, whilst at Lanchester there is a more equal balance between engineering and technology (31%) social and business studies (37%) and pure and applied science (24%).

4.01. The Timetable Analysis

Teaching (unlike learning!) is an activity which takes place for the most part in formal meetings between students and academic staff. The pattern of meetings is set down in the timetable and we consider that any attempt to explain the teaching process must begin here. Timetables are not one hundred per cent accurate but as a data source we believe them to be at least as accurate as the staff and/or student diary.

4.02.

Currently the lowest teaching administrative unit in the majority of institutions of higher education in the UK appears to be the study program ("course"). In our analysis of a study program we have broken it down into sets of meetings where a meeting is defined as a timetabled hour of contact between academic staff and students. A meeting may be described as a lecture, a seminar, a tutorial, a laboratory, an exercise class or whatever. Nevertheless we decided that the important differences between meetings lay in:

(i) the number of students involved;
(ii) the department providing the teacher; and
(iii) the type of space utilised i.e. specialist (laboratory, workshop, drawing office) or non specialist.

From the point of view of the pedagogical techniques likely to be deployed, the critical variable seemed to us to be the number of students in the group rather than its timetabled description. We saw no point in perpetuating the myth of a "lecture" to five and the "tutorial" to fifty.

4.03.

The basic unit of analysis, therefore, was the meeting. A study program constitutes a set of meetings. This set can be broken down into subsets on the basis of the department providing the tuition, the type of space utilised and the size of the student groups each assigned to one teacher. For a particular study program this subset of meetings might be compulsory or optional, could be taught to a single study program or might involve a number of study programs.

Consequently to analyse a set of meetings the following information was required:

(i) Total enrolment to a study program (denote by E)

(ii) The enrolment from a study program to a particular subset of meetings (denote by s where $s \geq E$);

(iii) The total enrolment from all programs of study attending a subset of meetings (denote by E^* where $E^* \geq s$);

(iv) The department providing the tuition for a subset of meetings;

(v) The type of space utilised - specialist and non specialist - by a subset of meetings;

(vi) The number of student groups each assigned to one teacher formed in a subset of meetings (denote by g); and

(vii) The total number of hours attended by a student in a particular subset of meetings of a particular group size (denote by h).

This information was collected for all the undergraduate programs in operation in 1972/73 at Loughborough and Lanchester (except art and design). (Identical data on the postgraduate taught programs at Loughborough has also been collected but not yet analysed).

4.04.

Given the above information we were able to establish for each year of a study program, for a department's programs, for discipline areas and for the institution the following values:

(i) Student load: this is the average hours of timetabled contact that the student received i.e.

$$\text{student load} = \frac{\sum (h.s)}{E}$$

(ii) Total Meetings timetabled for a particular study program:

$$\sum (h.g)$$

Summed over a department or discipline area or institution this statistic counts "joint" meetings several times hence:-

(iii) Allocatable Meetings: where several study programs attend the same set of meetings (i.e. $E^* > s$) the teaching hours were allocated pro rata to the number of students attending from a study program i.e.

$$\text{allocatable meetings} = \sum \left(h.g.\ \frac{s}{E^*}\right);$$

(iv) Group Size: This is the size of meeting the student actually attended i.e.

group size = $\frac{E^*}{g}$

(v) Average group size attended by the student i.e.

$$\frac{\sum \frac{E^*}{g} \cdot \left(\frac{h.s}{E}\right)}{\sum \left(\frac{h.s}{E}\right)} \text{ ; and}$$

(vii) The average group size provided by the institution i.e. :

$$\frac{\sum \frac{E^*}{g} \cdot \left(h.g. \frac{s}{E^*}\right)}{\sum \left(h.g. \frac{s}{E^*}\right)}$$

From (v) and (vi) it is possible to derive two frequency distributions: (v) shows the range of group sizes an average student attends and can be summed for a study program, department, discipline or institution; whereas the frequency distribution derived from (vi) shows the range of group sizes provided and because of the possibility of joint meetings crossing department or discipline boundaries may be meaningful only when summed for the whole institution.

4.05.

All study programs are based in a particular department and, therefore, discipline area and for a department or discipline area it is important to know whether the demand is from one's own study programs, or from some other departments' and whether it requires specialist space or not. Accordingly, we have analysed the totals of the values in 4.04 for study programs to reveal for each department and discipline area:-

(i) Own teaching in non specialist space;
(ii) Own teaching in specialist space;
(iii) Total own teaching;
(iv) Service teaching in non specialist space;
(v) Service teaching in specialist space;
(vi) Total service teaching;
(vii) Total teaching in non specialist space;
(viii) Total teaching in specialist space; and
(ix) Total teaching to the program.

4.06.

Some of the results of this analysis by discipline are presented in Appendix 1 but for convenience the overall results for the two institutions are given below in Tables 2, 3, and 4.

TABLE 2

SOME TIMETABLE STATISTICS 1972/73

	LANCHESTER				LOUGHBOROUGH		
PARTS	A	B	C	D	A	B	C
Enrolment	815	730	674	29	963	731	618
Student Load (hrs)	655	694	584	378	578	593	441
Meetings	42459	51672	51964	1864	40368	41046	31054
Allocatable Meetings	40794	50349	50473	1864	2[illegible]	22623	19352
Students' Average Group size	31.4	19.6	18.2	18.2	65.9	46.2	28.6
(Standard Deviation)	(27.3)	(22.4)	(22.7)	(7.7)	(31.9)	(23.5)	(22.3)
Institutions' Average Group Size	13.6	10.0	7.8	5.9	27.2	19.[illegible]	14.1
(Standard Deviation)	(15.5)	(9.8)	(9.0)	(7.8)	(32.8)	(22.7)	(14.3)

TABLE 3

FREQUENCY DISTRIBUTION OF AVERAGE STUDENTS' GROUP SIZES (HRS)

		LANCHESTER				LOUGHBOROUGH		
PARTS		A	B	C	D	A	B	C
Group Sizes	1	10	10	18	39	0	0	5
	2-5	26	37	78	15	7	19	18
	6-10	100	196	166	55	31	50	45
	11-15	135	181	95	0	64	71	64
	16-20	60	90	75	0	53	73	73
	21-30	74	47	72	267	77	59	76
	31-40	76	63	26	0	24	69	54
	41-60	66	43	42	0	85	90	66
	61-80	56	13	0	0	47	96	34
	81-100	37	0	0	0	52	14	0
	101-125	8	0	0	0	40	3	0
	126-150	0	0	0	0	25	15	0
	151-175	0	0	0	0	10	7	0
	176-200	0	7	7	0	39	13	0
	200+	0	0	0	0	17	6	1

4.07.

The 'Parts' referred to in The Tables correspond to all intents and purposes with academic years. The normal college attendance for first degrees is three years but in two study programs at Lanchester (Urban and Regional Planning and Social Work) the in-college study covers four years.

4.08.

From Tables 2 and 3 it would appear on the basis of the 1972/73 timetables that over the normal three year cycle an undergraduate at Lanchester received 1931 hours of timetabled tuition as compared with 1612 hours at Loughborough. In both cases the student found himself in group sizes varying from 1 to 60. However, the Loughborough undergraduates spent far more time in groups in excess of 60 and on average could expect to spend 24 hours over the three years in classes in excess of 200 students.

4.09.

The greatest divergence between the two institutions lay in the difference between the "meetings" and "allocatable meetings". The "meetings" are those formal academic staff/student contact hours per annum that would need to be provided if each study program is timetabled independently: the "allocatable meetings" summed over the whole institution are the meeting hours actually provided: any difference arises out of "joint" classes involving more than one study program. The economic possibilities of joint meetings are clearly demonstrated in the case of Loughborough where savings in undergraduate demands for tuition of about 47% were achieved in 1972/73 as compared with 3% for Lanchester.

An index of undergraduate tuition demands in hours per annum per student enrolled in college is given by:-

$$\frac{\text{Allocatable Meetings}}{\text{Enrolments}}$$

For the 72/73 data this index is as follows:-

PARTS	LANCHESTER	LOUGHBOROUGH
A	48	21
B	69	31
C	75	31
D	64	-

4.10.

It is important to appreciate the distinction between the students' average group size and the institutions' average group size. The former derived from value (v) in paragraph 4.04 identifies the average group size in which the average student finds himself i.e. his typical learning environment. The latter derived from value (vi) paragraph 4.04 identifies the average group size which the institution needs to provide. For example in the case of an enrolment of 20 students receiving one hour in a group of 5, one hour in a group of 10 and one hour in a group of 20, the students' average group size is 11.7. The institution, on the other hand, provides four hours of group size 5, two hours of group size 10 and one hour of group size 20 i.e. the institutions' average group size is 8.6. The institutions' average group size corresponds directly with the Pooling Committee's "average class size" familiar to the British polytechnic reader. Joint meetings rather than the number of enrolments to particular study programs are the major reason for the higher students' class size achieved at Loughborough.

TABLE 4

FREQUENCY DISTRIBUTION OF DEMAND FOR TEACHING SPACE (HRS)

GROUP	LANCHESTER						LOUGHBOROUGH				
SIZE	A	B	C	D	TOTAL	CUM %	A	B	C	TOTAL	CUM %
1	8450	7660	12405	1135	29650	20.6	392	156	3346	3894	6.2
2-5	4521	6521	13582	128	24755	37.9	1932	4915	2772	9619	21.6
6-10	9661	18268	13522	231	41682	66.9	3589	4676	3654	11919	40.7
11-15	8807	10388	4975	0	24170	83.8	4442	4019	3225	11686	59.4
16-20	2697	3824	2888	0	9409	90.4	2929	2977	2528	8434	72.9
21-30	2647	1564	1953	370	6534	95.0	2837	1836	1789	6462	83.2
31-40	1800	1332	511	0	3643	97.5	673	1435	922	3030	88.1
41-60	1052	612	608	0	2302	99.1	1605	1374	842	3821	94.2
61-80	689	150	0	0	839	99.7	651	951	306	1908	97.2
81-100	375	0	0	0	375	99.9	557	117	0	674	98.3
101-125	60	0	0	0	60	99.9	348	21	0	369	98.9
126-150	0	0	0	0	0	99.9	173	83	0	256	99.3
151-175	0	0	0	0	0	99.9	56	32	0	88	99.4
176-200	0	30	29	0	59	99.9	208	54	0	262	99.8
200+	3	0	0	0	3	100.0	79	24	4	107	100.0

4.11.

Table 4 sets out the total demands in 1972/73 in each institution for teaching space by various group sizes. The pattern of demand is typified at the ends of the distribution. Almost 21% of the demand at Lanchester was for individual tutorials as compared with 6% at Loughborough: on the other hand 17% of the demand at Loughborough was for groups greater than size 30 whilst at Lanchester only 5% of the demand was for groups of 30+ students. At Lanchester 28% of the total demand was for specialist teaching space as compared with 21% at Loughborough. The institution's average group size (and standard deviation) in specialist space was as follows:-

Parts	Lanchester	Loughborough
A	12.5 (8.0)	21.5 (11.8)
B	8.6 (5.5)	14.3 (8.7)
C	6.2 (5.0)	10.7 (5.8)
D	21.0 (0.0)	-

5.01. Student's Record

The following data on all undergraduate and taught postgraduate students at Loughborough and for most undergraduate students at Lanchester enrolled in 1972/73 has been collected:

(i) Year of entry, sex, marital status, date of birth, home or overseas;

(ii) Entry qualifications - examination boards and grades;

(iii) Subsequent academic record: study programs, parts, marks, grades; and, where it was available.

(iv) Details of first employer and initial salary.

Some of this information has been analysed and the results for discipline areas are presented in Appendix 2. For convenience the overall results for both institutions are presented below:

TABLE 5

SOME UNDERGRADUATE STATISTICS 1972/73

	LANCHESTER				LOUGHBOROUGH		
	A	B	C	D	A	B	C
A-LEVEL ENTRY							
MEAN	2.13	2.21	2.24	2.83	2.90	2.93	2.99
STANDARD DEVIATION	0.82	0.83	0.81	0.62	0.79	0.82	0.82
% ENROLMENTS							
PASS	0.60	0.88	0.97	0.86	0.82	0.85	0.95
TO CRD	0.11	0.01	0.00	0.00	0.04	0.04	0.00
	0.71	0.89	0.97	0.86	0.86	0.89	0.95
FAIL	0.22	0.09	0.03	0.03	0.09	0.09	0.03
NOT TAKEN	0.07	0.02	0.00	0.10	0.06	0.03	0.02
MEAN MARKS	51.79	55.27	58.40	60.38	53.33	54.29	58.15
STANDARD DEVIATION	10.19	8.19	7.47	5.14	10.81	10.89	9.69
CORRELATIONS							
RESULTS v A-LEVELS	+.15	+.05	+.14	-.24	+.29	+.27	+.15
B v A		+.46				+.63	
C v B			+.68				+.71
D v C				+.53			

5.02.

The A level grades have been calculated on the normal UCCA basis of A = 5, B = 4, C = 3, D = 2 and E = 1. In both institutions there is some evidence that the "quality" of the student intake as measured by mean A level grades has fallen very slightly over the years. However, this apparent fall in entry standards might be explained by the "weeding out" process of examinations. For the comparable Parts A, B and C the average Loughborough student with a mean A level of just below C was about three quarters of a grade above his Lanchester counterpart.

5.03.

Apart from Part A the pass, failure and "not taken" (wastage?) rates were similar in both institutions. The higher failure rate in Part A at Lanchester might be ascribed to the lower A level entry, but the low correlation between A levels and Part examinations suggest this explanation be treated with caution.

5.04.

There is a consistent and remarkably similar improvement in mean marks for Parts A to C in both institutions. This trend is accompanied by a tightening of the distribution of marks as the Parts proceed particularly at Lanchester.

This phenomena may be evidence of learning gain. On the other hand it may be merely illustrative of a tendency for examiners to fulfill their original "labelling" prophecies.

5.05.

The large sample sizes mean that the correlation coefficients for both institutions for Part A, B and C are significant. The correlation of A level grades with subsequent degree examination performance is consistently higher at Loughborough but even here A levels explain less than 9% of subsequent degree examination performance. The correlation between A levels and degree examinations was not materially affected by alternative measurements of A level such as "mean of best three A levels" or "number of A levels".

5.06.

The relationship between one Part and the preceding Part examination results is again stronger at Loughborough. In both institutions the correlation is increased as the Parts proceed. At Lanchester the Part A results explain just over 20% of the Part B results whilst Part B results explain about 45% of Part C results. At Loughborough the comparable percentages are 40 and 60.

5.07.

A comparison of mean ONC/OND marks and Part examinations resulted in the following correlation coefficients which are all significant at the 5% level:

Part	Lanchester		Loughborough	
	N	r	N	r
A	69	+.40	93	+.44
B	75	+.29	66	+.37
C	50	+.31	65	+.27

In all cases the coefficients are somewhat higher than the A level correlations and explain about 16% of Part A results. This stronger correlation may be accounted for by the higher probability of a good "match" between ONC/OND material and degree syllabuses.

5.08.

TABLE 6

FIRST SALARY DATA GRADUATES 1972/73 £ AND CORRELATION WITH FINAL MARK

DISCIPLINE	LANCHESTER				LOUGHBOROUGH			
	N	M £	SD	r	N	M £	SD	r
3	56	1778	286	-.10	190	1725	388	+.17+
5	32	1523	364	+.13	83	1503	279	+.02
6	51	1696	359	-.01	26	1756	346	+.55*
7a	-	-	-	-	-	-	-	-
7b	-	-	-	-	11	1466	106	+.14
8	6	1488	302	+.47	8	1396	102	+.07
All	145	1681	347	+.03	318	1654	365	+.19*

* Significant at the 5% level.

Information on initial salaries was available for just over 20% of the graduates at Lanchester and 50% at Loughborough. The overall mean salaries and the pattern across disciplines in each institution are similar. It appears that discipline area rather than institution is a more important determinant of initial salary. The correlation between final degree marks and initial salary is positive for all the disciplines at Loughborough and most of those at Lanchester but by no means strong.

5.09. Postscript

The team is currently working on a number of problem areas: the measurement of "learning gain"; the development of a rationale for the allocation of administrators, technicians, consumables and equipment to study programs. It will be appreciated that our objective is not to undertake a comparison between Loughborough and Lanchester but to develop a methodology for accounting for inputs and outputs. However, it seemed preferable to establish the significance and sensitivity of our measurements in the Loughborough/Lanchester context before involving the associated institutions in a demanding data collection exercise.

6.00.

The project team have benefitted greatly from the advice and comments from the members of the Steering Committee, the members of which are given in Appendix 3.

Appendix 1

Timetable Analysis

Some results for Lanchester and Loughborough 1972/73 analysed by discipline.

I	Part A	Enrolments,	Student Load,	Meetings,	Allocatable Meetings,	Group Sizes.		
II	Part B	"	"	"	"	"	"	"
III	Part C	"	"	"	"	"	"	"
IV	Part D	"	"	"	"	"	"	"
V	Lanchester	Frequency Distribution (Hrs/Annum)	Students'	Group	Sizes.			
VI	Loughborough	"	"	"	"	"	"	

	Discipline Group	Illustrative departments falling within group
1	Education	
2	Health	Pharmacy, Other departments allied to medicine and health.
3.	Technology and engineering	Aeronautical, chemical, civil, electrical, mechanical, and production engineering; mining, metallurgy, building, surveying and general engineering. General technology and manufacture e.g. textile technology printing and book production.
4.	Agriculture	
5	Science and applied sciences	Biology, botany, zoology and combinations of biological sciences, Mathematics, physics, chemistry, geology.
6	Social (administrative and business) studies	Management studies, economics, geography, government and public administration, law, sociology, liberal studies, accountancy.
7a	Vocational - architecture and town and country planning	Architecture, town and country planning.
7b	Vocational - other	Catering, institutional management, home economics, Librarianship, nautical studies, transport.
8	Languages (literature and area) studies	
9	Arts (other than Languages)	History, archaeology, philosophy.
1C	Art and Design	Art and design, drama, music.

I

PART A ENROLMENTS, STUDENT LOAD, MEETINGS, ALLOCATABLE MEETINGS, GROUP SIZES BY DISCIPLINE

DISCIPLINE	ENROLMENTS	STUDENT LOAD (HRS)	MEETINGS (HRS)	ALLOCATABLE MEETINGS (HRS)	STUDENTS' AVERAGE GROUP SIZE (STANDARD DEVIATION)	INSTITUTIONS' AVERAGE GROUP SIZE (STANDARD DEVIATION)
LANCHESTER						
3	246	796	16741	16625	[illegible] (14.5)	11.8 (10.5)
5	222	789	11750	11750	36.2 (32.6)	14.9 (17.8)
6	315	468	11690	10646	39.2 (31.5)	13.9 (18.7)
7a	24	510	740	740	23.6 (3.2)	16.5 (10.8)
8	38	589	1529	1023	36.1 (7.3)	21.9 (17.6)
TOTAL	845	654	42459	40784	31.4 (27.3)	13.6 (15.5)
LOUGHBOROUGH						
1	22	490	1590	573	53.0 (48.8)	18.7 (25.2)
3	485	620	17066	10391	70.9 (64.8)	28.9 (34.8)
5	214	582	14357	4469	59.4 (49.5)	27.8 (29.5)
6	174	498	10255	2802	77.5 (54.7)	30.8 (37.9)
7b	29	567	1390	1180	27.7 (41.0)	13.9 (13.8)
8	39	455	1110	1028	45.5 (57.1)	17.2 (22.0)
TOTAL	963	578	46368	20443	66.9 (61.9)	27.2 (32.8)

II

PART B ENROLMENTS, STUDENT LOAD, MEETINGS, ALLOCATABLE MEETINGS, GROUP SIZES, BY DISCIPLINE

DISCIPLINE	ENROLMENTS	STUDENT LOAD (HRS)	MEETINGS (HRS)	ALLOCATABLE MEETINGS (HRS)	STUDENTS' AVERAGE GROUP SIZE (STANDARD DEVIATION)	INSTITUTIONS' AVERAGE GROUP SIZE (STANDARD DEVIATION)
LANCHESTER						
3	234	831	22183	22183	11.6 (4.8)	8.8 (4.9)
5	163	941	15255	15255	14.5 (9.2)	10.1 (6.7)
6	277	453	12089	11214	36.1 (38.1)	13.2 (16.1)
7a	23	500	720	720	22.6 (3.1)	16.0 (10.3)
8	33	625	1425	977	31.4 (5.2)	21.1 (14.7)
TOTAL	730	692	51672	50349	19.6 (22.4)	10.0 (9.8)
LOUGHBOROUGH						
1	7	527	1185	397	37.4 (44.3)	9.1 (15.6)
3	413	632	18874	12751	54.8 (46.7)	20.4 (26.5)
5	192	599	8697	5470	36.7 (29.7)	20.8 (18.1)
6	80	435	9500	2294	29.2 (30.3)	15.1 (14.5)
7b	21	497	1710	974	15.8 (11.3)	10.7 (7.4)
8	19	480	1080	737	21.8 (17.4)	12.4 (10.8)
TOTAL	732	593	41046	22623	46.2 (28.5)	19.1 (22.7)

III

PART C ENROLMENTS, STUDENTS' LOAD, MEETINGS, ALLOCATABLE MEETINGS, GROUP SIZES, BY DISCIPLINE

DISCIPLINE	ENROLMENTS	STUDENT LOAD (HRS)	MEETINGS (HRS)	ALLOCATABLE MEETINGS (HRS)	STUDENTS' AVERAGE GROUP SIZE (STANDARD DEVIATION)	INSTITUTIONS' AVERAGE GROUP SIZE (STANDARD DEVIATION)
LANCHESTER						
3	212	702	23293	23293	11.6 (7.7)	3.4 (5.8)
5	157	741	17062	17062	11.5 (7.9)	6.8 (5.6)
6	256	404	9599	8609	33.5 (38.0)	12.0 (16.1)
7a	19	480	660	660	18.6 (2.6)	13.8 (8.2)
8	50	520	1350	848	28.1 (5.3)	18.4 (13.4)
TOTAL	674	584	51964	50473	18.2 (22.7)	7.8 (9.0)
LOUGHBOROUGH						
1	2	100	120	30	18.5 (14.9)	6.4 (8.6)
3	351	43[illegible]	13854	8848	35.2 (25.8)	17.2 (17.6)
5	161	507	9330	7048	20.9 (13.0)	11.6 (10.4)
6	62	373	5720	1993	19.8 (10.9)	11.6 (9.7)
7b	15	332	720	720	8.3 (3.5)	6.9 (3.0)
8	27	390	810	713	23.3 (13.7)	14.7 (11.2)
TOTAL	618	441	31054	19352	28.6 (22.3)	14.1 (14.3)

IV

PART D ENROLMENTS, STUDENTS' LOAD, MEETINGS, ALLOCATABLE MEETINGS, GROUP SIZES BY DISCIPLINE

DISCIPLINE	ENROLMENTS	STUDENTS' LOAD (HRS)	MEETINGS (HRS)	ALLOCATABLE MEETINGS (HRS)	STUDENTS' AVERAGE GROUP SIZE (STANDARD DEVIATION)	INSTITUTIONS' AVERAGE GROUP SIZE (STANDARD DEVIATION)
LANCHESTER						
3	-	-	-	-	-	-
5	-	-	-	-	-	-
6	8	308	759	759	5.4 (2.3)	3.3 (2.7)
7a	21	405	1105	1105	19.3 (5.6)	7.7 (9.4)
8	-	-	-	-	-	-
TOTAL	29	378	1864	1864	16.2 (7.7)	5.9 (7.8)

KEY TO GROUP SIZES.

1	1
2	2-5
3	6-10
4	11-15
5	16-20
6	21-30
7	31-40
8	41-60
9	61-80
10	81-100
11	101-125
12	126-150
13	151-175
14	176-200
15	201+

LANCHESTER

FREQUENCY DISTRIBUTION (HOURS/ANNUM) OF STUDENTS' GROUP SIZES BY DISCIPLINE 1972/73

DISCIPLINE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PART A															
3	10	75	103	196	150	71	109	79	0	0	0	0	0	0	0
5	10	15	103	180	43	138	74	46	71	72	33	0	0	0	0
6	10	1	116	78	13	9	0	85	100	50	0	0	0	0	0
7a	10	0	0	0	0	500	0	0	0	0	0	0	0	0	0
8	10	0	0	30	0	0	549	0	0	0	0	0	0	0	0
ALL	10	26	100	135	60	74	76	66	56	37	8	0	0	0	0
PART B															
3	10	75	314	237	145	48	0	0	0	0	0	0	0	0	0
5	10	33	285	357	136	16	81	18	0	0	0	0	0	0	0
6	11	11	15	83	66	35	25	53	104	36	0	0	0	20	0
7a	10	0	0	0	490	0	0	0	0	0	0	0	0	0	0
8	10	0	0	0	0	60	555	0	0	0	0	0	0	0	0
ALL	10	37	196	181	90	47	63	43	13	0	0	0	0	7	0
PART C															
3	26	139	212	124	92	56	38	0	0	0	0	0	0	0	0
5	22	131	267	116	106	49	0	17	0	0	0	0	0	0	0
6	10	8	98	49	14	62	38	101	0	0	0	0	0	20	0
7a	10	0	0	0	470	0	0	0	0	0	0	0	0	0	0
8	10	0	0	0	60	0	450	0	0	0	0	0	0	0	0
ALL	18	78	166	95	75	72	26	42	0	0	0	0	0	7	0
PART D															
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	50	56	202	0	0	0	0	0	0	0	0	0	0	0	0
7a	35	0	0	0	0	370	0	0	0	0	0	0	0	0	0
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ALL	39	15	55	0	0	267	0	0	0	0	0	0	0	0	0

LOUGHBOROUGH

FREQUENCY DISTRIBUTIONS (HOURS/ANNUM) OF STUDENTS' GROUP SIZES BY DISCIPLINE 1972/73

DISCIPLINE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PART "A"															
1	4	0	56	90	0	104	0	70	0	83	38	19	19	1	3
3	0	6	27	58	71	78	25	83	75	31	49	16	1	72	22
5	0	19	0	47	46	143	42	68	29	109	3	45	0	4	18
6	0	0	53	28	11	22	12	146	15	41	71	35	35	13	11
7b	0	0	166	270	64	0	1	1	0	0	20	20	20	0	0
8	0	0	35	240	60	0	0	0	0	60	0	0	60	0	0
All	0	7	31	64	53	77	24	85	47	52	40	25	10	39	17
PART "B"															
1	0	112	98	7	105	32	0	28	17	100	8	0	0	11	5
3	0	24	32	49	86	72	59	79	128	21	6	25	12	21	10
5	0	2	50	121	45	60	76	139	90	4	0	0	0	3	3
6	0	19	87	38	92	25	101	52	0	0	0	7	4	5	0
7b	0	50	45	242	68	0	69	21	0	0	0	0	0	0	0
8	0	30	270	0	0	0	90	90	0	0	0	0	0	0	0
All	0	19	50	71	73	59	69	90	96	14	3	15	7	13	6
PART "C"															
1	0	25	20	5	0	30	0	20	0	0	0	0	0	0	0
3	3	11	38	44	47	67	62	95	59	0	0	0	0	0	2
5	11	15	43	128	151	60	66	28	1	0	0	0	0	0	0
8	4	44	53	26	70	139	12	20	0	0	0	0	0	0	0
7b	0	150	82	100	0	0	0	0	0	0	0	0	0	0	0
6	0	0	122	27	0	180	0	60	0	0	0	0	0	0	0
All	5	18	45	64	73	78	54	68	34	0	0	0	0	0	1

Appendix 2

Student Record

Some results for Lanchester and Loughborough 1972/73 analysed by discipline.

I	Part A Undergraduate Results
II	Part B Undergraduate Results
III	Part C Undergraduate Results
IV	Part D Undergraduate Results
V	Mean A level Scores
VI	Correlation of Mean A level Scores with Parts
VII	Correlation Part with Preceding Part Results
VIII	Correlation of Mean ONC/OND Scores with Parts

Discipline Group	Illustrative departments falling within group
1 Education	
2 Health	Pharmacy, Other departments allied to medicine and health.
3. Technology and engineering	Aeronautical, chemical, civil, electrical, mechanical, and production engineering; mining, metallurgy, building, surveying and general engineering. General technology and manufacture e.g. textile technology printing and book production.
4 Agriculture	
5 Science and applied sciences	Biology, botany, zoology and combinations of biological sciences, Mathematics, physics, chemistry, geology.
6 Social (administrative and business) studies	Management studies, economics, geography, government and public administration, law, sociology, liberal studies, accountancy.
7a Vocational - architecture and town and country planning	Architecture, town and country planning.
7b Vocational - other	Catering, institutional management, home economics, Librarianship, nautical studies, transport.
8 Languages (literature and area) studies	
9 Arts (other than Languages)	History, archaeology, philosophy.
10 Art and Design	Art and design, drama, music.

1972/73 PART A UNDERGRADUATE RESULTS BY DISCIPLINE

DISCIPLINE	ENROL	PASS	TO ORD	FAIL	NOT TAKEN	MEAN MARK	STANDARD DEVIATION
LANCHESTER							
3	270	131 (0.49)	46 (0.17)	70 (0.26)	23 (0.08)	53.68	11.19
5	222	102 (0.46)	39 (0.18)	65 (0.29)	16 (0.07)	50.77	10.50
6	316	245 (0.78)	11 (0.03)	43 (0.14)	16 (0.05)	50.36	9.11
7a	24	21 (0.88)	0 (0.00)	2 (0.08)	1 (0.04)	58.09	4.09
8	38	24 (0.63)	0 (0.00)	8 (0.21)	6 (0.16)	52.66	8.53
TOTAL	869	523 (0.60)	96 (0.11)	188 (0.22)	62 (0.07)	51.79	10.19
LOUGHBOROUGH							
1	22	19 (0.86)	0 (0.00)	3 (0.14)	0 (0.00)	51.77	10.65
3	697	567 (0.81)	27 (0.04)	68 (0.10)	35 (0.06)	53.60	11.26
5	214	165 (0.77)	13 (0.06)	17 (0.08)	19 (0.09)	51.55	12.30
6	175	151 (0.86)	4 (0.02)	9 (0.05)	11 (0.06)	54.14	8.07
7b	29	28 (0.97)	0 (0.00)	1 (0.03)	0 (0.00)	55.55	6.68
8	39	34 (0.87)	0 (0.00)	5 (0.11)	0 (0.00)	53.34	5.23
TOTAL	1176	964 (0.82)	44 (0.04)	103 (0.09)	65 (0.06)	53.33	10.81

1972/73 PART B UNDERGRADUATE RESULTS BY DISCIPLINE

DISCIPLINE	ENROL	PASS	TO ORD	FAIL	NOT TAKEN	MEAN MARK	STANDARD DEVIATION
LANCHESTER							
3	234	195 (0.83)	3 (0.01)	35 (0.15)	1 (0.00)	56.56	9.26
5	163	136 (0.83)	3 (0.02)	20 (0.12)	4 (0.02)	55.66	9.66
6	277	259 (0.94)	1 (0.00)	13 (0.05)	4 (0.01)	54.15	6.38
7a	23	23 (1.00)	0 (0.00)	0 (0.00)	0 (0.00)	53.09	5.35
8	33	29 (0.88)	0 (0.00)	1 (0.03)	3 (0.09)	55.03	4.91
TOTAL	730	642 (0.88)	7 (0.01)	69 (0.09)	12 (0.02)	55.27	8.19
LOUGHBOROUGH							
1	7	5 (0.71)	0 (0.00)	1 (0.14)	1 (0.14)	51.67	5.59
3	413	341 (0.83)	26 (0.06)	40 (0.10)	6 (0.01)	54.75	11.36
5	192	170 (0.89)	0 (0.00)	16 (0.08)	6 (0.03)	53.22	11.46
6	80	71 (0.89)	0 (0.00)	5 (0.06)	4 (0.05)	54.38	8.29
7b	21	19 (0.90)	0 (0.00)	0 (0.00)	2 (0.10)	58.84	5.13
8	19	16 (0.84)	0 (0.00)	3 (0.16)	0 (0.00)	50.58	6.22
TOTAL	732	622 (0.85)	26 (0.04)	65 (0.09)	19 (0.03)	54.29	10.89

III

1972/73 PART C UNDERGRADUATE RESULTS BY DISCIPLINE

DISCIPLINE	ENROL	PASS	TO ORD	FAIL	NOT TAKEN	MEAN MARK	STANDARD DEVIATION
LANCHESTER							
3	212	208 (0.98)	0 (0.00)	4 (0.02)	0 (0.00)	62.41	7.52
5	157	148 (0.94)	0 (0.00)	9 (0.06)	0 (0.00)	57.88	8.36
6	256	250 (0.98)	0 (0.00)	4 (0.02)	2 (0.01)	55.69	5.88
7a	19	18 (0.95)	0 (0.00)	0 (0.00)	1 (0.05)	57.44	4.70
8	30	30 (1.00)	0 (0.00)	0 (0.00)	0 (0.00)	56.00	4.68
TOTAL	674	654 (0.97)	0 (0.00)	17 (0.03)	3 (0.00)	58.40	7.47
LOUGHBOROUGH							
1	2	2 (1.00)	0 (0.00)	0 (0.00)	0 (0.00)	51.00	7.00
3	351	331 (0.94)	0 (0.00)	13 (0.04)	7 (0.02)	59.65	9.52
5	161	152 (0.94)	0 (0.00)	7 (0.04)	2 (0.01)	56.14	10.66
6	62	62 (0.98)	0 (0.00)	1 (0.02)	0 (0.00)	55.42	7.34
7b	15	15 (1.00)	0 (0.00)	0 (0.00)	0 (0.00)	61.93	9.30
8	27	27 (1.00)	0 (0.00)	0 (0.00)	0 (0.00)	55.56	5.82
TOTAL	618	588 (0.95)	0 (0.00)	21 (0.03)	0 (0.00)	58.15	9.69

1972/73 PART D UNDERGRADUATE RESULTS BY DISCIPLINE

DISCIPLINE	ENROL	PASS	TO ORD	FAIL	NOT TAKEN	MEAN MARK	STANDARD DEVIATION
3	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-
6	8	8 (1.00)	0 (0.00)	0 (0.00)	0 (0.00)	64.00	4.72
7a	21	17 (0.81)	0 (0.00)	1 (0.05)	3 (0.14)	58.78	4.46
8	-	-	-	-	-	-	-
TOTAL	29	25 (0.86)	0 (0.00)	1 (0.03)	3 (0.10)	60.38	5.14

MEAN A-LEVEL SCORES FOR UNDERGRADUATES ENROLLED 1972/73
BY DISCIPLINE

DISCIPLINE	PART A			PART B			PART C			PART D		
LANCHESTER	N	M	SD	N	M	SD	N	M	SD	N	M	SD
3	178	1.95	0.84	100	1.91	0.85	85	2.01	0.79	-	-	-
5	194	1.80	0.72	124	1.80	0.70	112	1.83	0.89	-	-	-
6	295	2.34	0.77	242	2.42	0.73	224	2.44	0.67	6	2.73	0.40
7a	24	2.84	0.73	19	2.59	0.91	19	2.95	0.68	16	2.87	0.68
8	34	2.54	0.78	31	3.02	0.75	29	2.57	0.63	-	-	-
TOTAL	725	2.13	0.82	516	2.21	0.83	469	2.24	0.81	22	2.83	0.62
LOUGHBOROUGH												
1	21	2.55	0.73	5	3.14	0.47	1	1.70	0.00	-	-	-
3	545	2.96	0.81	329	3.00	0.82	269	2.98	0.77	-	-	-
5	205	2.79	0.80	185	2.86	0.82	150	3.07	0.81	-	-	-
6	166	2.77	0.69	65	2.66	0.70	54	2.68	0.96	-	-	-
7b	29	2.98	0.76	21	2.90	0.75	15	2.83	0.85	-	-	-
8	39	3.45	0.59	19	3.36	0.89	27	3.34	0.72	-	-	-
TOTAL	1005	2.90	0.79	624	2.93	0.82	516	2.99	0.82	-	-	-

CORRELATION: MEAN A-LEVEL SCORES WITH PARTS UNDERGRADUATES 1972/73

DISCIPLINE	A		B		C		D	
LANCHESTER	N	r	N	r	N	r	N	r
3	158	+.22	100	+.10	85	+.19	-	-
5	182	+.00	121	-.01	111	+.38	-	-
6	281	+.20	239	+.18	221	+.12	6	+.42
7a	23	+.12	19	-.30	18	+.36	15	-.40
8	30	+.31	28	+.43	29	+.44	-	-
TOTAL	674	+.15	507	+.05	464	+.14	21	-.24
LOUGHBOROUGH								
1	21	+.38	5	-.68	1	-	-	-
3	518	+.31	320	+.31	264	+.10	-	-
5	188	+.33	176	+.28	147	+.26	-	-
6	155	+.22	61	-.07	53	-.10	-	-
7b	29	+.00	19	+.36	15	+.47	-	-
8	38	+.45	19	+.64	27	+.31	-	-
TOTAL	949	+.29	600	+.27	507	+.15	-	-

CORRELATION PART WITH PRECEDING PART RESULTS UNDERGRADUATES 1972/73

DISCIPLINE	B v A		C v B		D v C	
LANCHESTER	N	r	N	r	N	r
3	198	+.48	211	+.62	-	-
5	152	+.39	156	+.68	-	-
6	273	+.39	252	+.59	8	+.88
7a	23	+.40	18	+.73	18	+.30
8	30	+.72	30	+.71	-	-
TOTAL	676	+.46	667	+.68	26	+.53
LOUGHBOROUGH						
1	6	+.72	2	-1.00	-	-
3	400	+.67	343	+.70	-	-
5	182	+.62	156	+.77	-	-
6	76	+.27	62	+.50	-	-
7b	18	+.75	15	+.75	-	-
8	19	+.70	27	+.74	-	-
TOTAL	701	+.63	605	+.71	-	-

VIII

CORRELATION MEAN ONC/OND SCORES WITH PARTS 1972/73 BY DISCIPLINE

DISCIPLINE	A		B		C	
LANCHESTER	N	r	N	r	N	r
3	52	+.25	54	+.23	32	+.06
5	8	+.78	11	+.02	8	-.05
6	9	+.43	10	+.43	9	+.75
7a	-	-	-	-	-	-
8	-	-	-	-	1	-
TOTAL	69	+.40	75	+.29	50	+.31
LOUGHBOROUGH						
1	1	-	1	-	1	-
3	87	+.44	58	+.35	57	+.15
5	3	+.96	2	+1.00	6	+.73
6	2	+1.00	5	+.74	1	-
7b	-	-	-	-	-	-
8	-	-	-	-	-	-
TOTAL	93	+.44	66	+.37	65	+.25

Appendix 3

Steering Committee

J.R. Calvert	Loughborough University of Technology (Secretary to the Committee)
Prof. L. Cantor	Loughborough University of Technology
P. Cordle	Assistant Treasurer, West Midlands Metropolitan Authority
Dr. Legg	Lanchester Polytechnic, (Chairman of the Committee)
K. Houghton	Polytechnic of Central London
A.F. Nightingale	Polytechnic, Huddersfield
Dr. W. Palmer	Lanchester Polytechnic
Dr. F. Pearson	Lanchester Polytechnic
F.L. Roberts	Registrar, Loughborough University of Technology
B. Rodmell	Senior Economic Adviser, Department of Education and Science, London.
Prof. P. Rivett	Sussex University
Prof. J. Sizer	Loughborough University of Technology

Project Team

Prof. J. Sizer	Project Director
D.W. Birch	Loughborough University of Technology, (Deputy Project Director)
J. Calvert	Loughborough University of Technology
J. Dockerill	Lanchester Polytechnic
J. Greenwood	Loughborough University of Technology, (Research Assistant)
B. Wardell	Lanchester Polytechnic, (Part-time Clerk)
C.E. Hann	Loughborough University of Technology, (Part-time Clerk)